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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/762,097	01/20/2004	Berthold Hahn	5367-252PCON.	4556

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EXAMINER	
TRINH, MICHAEL MANH	
ART UNIT	**PAPER NUMBER**
2822	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/18/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/762,097	HAHN ET AL.	
	Examiner	Art Unit	
	Michael Trinh	2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 January 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17 and 34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17 and 34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

*** This office action is in response to Applicant's Amendment January 25, 2007. Claims 1-17,34 are pending. Claims 18-33 were canceled by Applicant.

*** The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 102

1. Claims 1,3-5 are rejected under 35 U.S.C. 102(b) as being anticipated by Kawaguchi et al (Article title "The formation of crystalline defects...", 1998, pp 24-26).

Re claim 1: Kawaguchi teaches (at pages 24-28) a method for forming a light-emitting device (page 24, last 7 lines) comprising at least the steps of: forming at least one compound semiconductor layer based on gallium nitride and being an active layer or a part of an active layer sequence of the light emitting device (page 24, last 7 lines, pages 25,27); and setting growth parameters used during production of the compound semiconductor layer such that, at least in some cases in a vicinity of dislocations in the compound semiconductor layer, regions are produced in the compound semiconductor thickness than remaining regions of the layer having a lower compound semiconductor layer (Fig 4, page 28), and, re claim 1, so as to build up a shielding energy barrier in the regions having the lower thickness more than the other remaining regions such that the shielding energy barriers suppress diffusion of charge carriers toward the dislocation, inherently. Re claim 3, the regions are formed with the lower thickness to be less than half as thick as the remaining regions of the compound semiconductor layer (as shown in Figure 4b; page 28). Re claim 4, wherein the compound semiconductor layer is formed from an $In_xAl_yGa_{1-x-y}N$ compound semiconductor, where $0 <= x <= 1$, $0 <= y <= 1$ and $x+y <= 1$ (page 24, last 7 lines; Abstract; page 25). Re claim 5, wherein AlGaN is provided when $x=0$ in the $In_xAl_yGa_{1-x-y}N$ (page 24, last 7, lines).

Claim Rejections - 35 USC § 103

2. Claims 2,6-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawaguchi et al (Article title "The formation of crystalline defects...", 1998, pp 24-26) taken with Applicant's admitted prior art (present specification page 1-3).

Kawaguchi teaches (at pages 24-28) a method for forming a light-emitting device as applied to claims 1,3-5 above. Re claim 12, wherein the substrate includes sapphire (page 25, left column, lines 14-20).

Re claim 2, Kawaguchi teaches forming a light emitting device (LED), but lacks detailing about forming a first coating layer and second coating layer as in claim 2. Re claims 7-8, the first and second coating layer including $Ga_uAl_{1-u}N$. Re claim 9, MOCVD for depositing the coating layers. Re claim 10, including a buffer layer on the substrate. Re claim 11, the buffer layer include $Ga_mAl_{1-m}N$.

However, re claim 2, Applicant's admitted prior art teaches (at specification page 2, line 6 through page 3) forming a first coating layer formed from a compound semiconductor based on gallium nitride of a first conductivity type on the substrate; forming the compound semiconductor layer, as a light-emitting layer, over the first coating layer; and forming a second coating layer formed from a compound semiconductor based on gallium nitride of a second conductivity type over the light-emitting layer, a composition of the compound semiconductor layer based on gallium nitride differing from a composition of the compound semiconductor of the first and second coating layers (present specification page 2, lines 6-26); wherein, re claims 7-8, the first and second coating layer include AlGaN layer (present specification page 2, lines 20-25); wherein, re claim 9, MOCVD is used for depositing the coating layers; and wherein, re claims 10-11, a buffer layer of GaN (m=1) is formed on the substrate, and wherein the first coating layer is formed on the buffer layer (present specification page 2, lines 20-25).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the light emitting device of Kawaguchi by forming a first coating layer and a second coating layers of AlGaN layer with a buffer layer on the substrate as taught by Applicant's admitted prior art. This is because of the desirability to form a high power structure blue and violet light emitting diode device.

Re claim 6, Kawaguchi does not detail about doping with foreign substance.

However, Applicants' admitted prior art also teaches (at present specification page 3, lines 22-25) doping the light-emitting layer with a p-type foreign substance and/or an n-type foreign substance to improve the luminance.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to the light emitting device of Kawaguchi by doping the light-emitting layer with a p-type foreign substance and/or an n-type foreign substance as taught by Applicant's admitted prior art. This is because of the desirability to improve the luminance of the light emitting device.

3. Claims 13-17,34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawaguchi et al (Article title "The formation of crystalline defects...", 1998, pp 24-26) taken with Mukai (Article title "InGaN-Based Blue Light Emitting Diodes..." L839-841).

Kawaguchi teaches (at pages 24-28) a method for forming a light-emitting device as applied to claims 1,3-5 above, wherein re claim 34, wherein forming the at least one compound semiconductor includes forming the active layer or a part of the active layer of the light emitting device (page 24, last 7 lines, pages 25,27).

Re claims 13-17, Kawaguchi teaches forming an active layer, but lacks mentioning, re claim 13, the active layer sequence with a quantum film structure, re claim 14, including at least one GaN quantum film; re claim 15, as an InGaN/GaN quantum film structure; re claim 16, with at least one undoped GaN quantum film; and re claim 17, with a GaN quantum film or with an intrinsic GaN quantum film.

However, Mukai teaches (at Figure 1; page L839) forming a light emitting diodes including an active layer sequence with a quantum film (single quantum well , SQW, re claim 13), wherein the quantum film includes at least one GaN quantum film (re claim 15), wherein the quantum film structure includes an InGaN/GaN (Figure 1; re claim 16); wherein the quantum film includes at least one undoped GaN quantum film (Figure 1, re claim 17); and wherein the quantum film includes a GaN quantum film as an intrinsic GaN quantum film (Figure 1, re claim 18).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to the light emitting device of Kawaguchi by forming the active layer sequence with the single quantum film as taught by Mukai above. This is because of the desirability to form a highly efficient blue/green InGaN singly quantum well structure light emitting diodes (LED).

Response to Amendment

4. Applicant's remarks filed January 25, 2007 with respect to claims 1-17,34 have been considered but are moot in view of the new ground(s) of rejection.

** Applicant initially remarked (remark page 9) about "....Applicant's specification..., the Wurtzite structure of the group III nitrides and the strongly polar nature of the Ga/In/Al-nitrogen bond...".

In response, claimed subject matter, not the specification, is the measure of invention. Limitations in the specification cannot be read into the claims for the purpose of avoiding the prior art. In Re Self, 213 USPQ 1,5 (CCPA 1982); In Re Priest, 199 USPQ 11,15 (CCPA 1978).

** Applicant remarked (at remark page 9) about Kawaguchi that "...by increasing the layer thickness (see page 24, last paragraph to page 25, first paragraph). This means that in the vicinity of dislocation (i.e. in the regions of lower thickness), the indium mole fraction is higher in the regions of greater thickness...".

In response, again this is noted and found unconvincing. First, claimed subject matter, not the specification, is the measure of invention. Limitations in the specification cannot be read into the claims for the purpose of avoiding the prior art. In Re Self, 213 USPQ 1,5 (CCPA 1982); In Re Priest, 199 USPQ 11,15 (CCPA 1978). Nowhere in the claims mentions about indium mole fraction. Herein, Kawaguchi clearly teaches the invention as claimed by setting growth parameters used during production of the compound semiconductor layer such that, at least in some cases in a vicinity of dislocations in the compound semiconductor layer, regions are produced in the compound semiconductor thickness than remaining regions of the layer having a lower compound semiconductor layer (Fig 4, page 28), so as to build up a shielding energy barrier in the regions having the lower thickness more than the other remaining regions such that the shielding energy barriers suppress diffusion of charge carriers toward the dislocation, inherently.

Second, contrary to Applicant's remarks, Kawaguchi differently teaches (at page 27, from last paragraph of left column to page 28) that "...diagram shown in Fig. 3 indicates the layer thickness dependence of the indium mole fraction x...The first $In_xGa_{1-x}N$ layer (Region I) near the interface of $In_xGa_{1-x}N$/GaN has lower indium mole fraction x expressed by the open squares, and in the second layer..., the indium mole fraction expressed by the solid circles is

raised up...". Accordingly, in Kawaguchi, the indium mole fraction in the region I at the regions having lower thickness than remaining thick regions in the same region I is not much different and about the same.

In the absence of no objective evidence to prove to the contrary between the claimed invention as recited in base claim 1 and that of Kawaguchi, the reduction in the thickness of the compound layer near the vicinity of dislocations, as similarly disclosed by Kawaguchi, also causes to build up shielding energy barrier, inherently. By growing to form the compound semiconductor layer as disclosed by Kawaguchi, which is *similar to the invention as claimed* in claim 1, in which in a vicinity of dislocations in the compound semiconductor layer, the compound semiconductor layer is formed with regions having lower thickness than remaining regions of the compound semiconductor layer so as to a shielding energy barrier is building up in the regions having the lower thickness more than the other remaining regions such that the shielding energy barriers suppress diffusion of charge carriers toward the dislocations, inherently.

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Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael M. Trinh whose telephone number is (571) 272-1847. The examiner can normally be reached on M-F: 9:00 Am to 5:30 Pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on (571) 272-2429. The central fax phone number is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).
Oacs-18

Michael Trinh
Primary Examiner